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(54) COATING COMPOSITION AND METHOD OF FORMING DESIGNED PAINT FILM

(57)Abstract:

PURPOSE: To provide a coating composition in which lanthanum boride is contained in the vehicle, thus developing excellent deep tone and gloss and can form purplish red color coating film without whitening and slight turbidity and is useful in coating the outer surfaces of motor vehicles requiring high-class coating color tones.

CONSTITUTION: This composition comprises (A) a vehicle, (B) lanthanum boride and (C) a brilliant pigment. For example, the component B is lanthanum tetraboride (LaB₄) and/or lanthanum hexaboride (LaB₆), and the amounts of components B and C are 5-35 and 0.1-6 pts.wt. per 100 pts.wt. of component A, respectively. As component C, are cited flake Al pigment, a mica pigment coated with a metal oxide, which is called pearl mica pigment, platelet iron oxide pigment, metal-plated glass flake pigment or graphite, while the component A is preferably a mixture of a thermosetting resin such as an acrylic resin, an amino resin and/or a crosslinking agent such as a (blocked) isocyanate.

CLAIMS

[Claim(s)]

[Claim 1] The paint constituent characterized by containing a vehicle and a HOU-ized lanthanum.

[Claim 2] The paint constituent characterized by containing a vehicle, a HOU-ized lanthanum, and a photoluminescent pigment.

[Claim 3] The design nature paint film formation method characterized by giving the ground-coat formation process that the lightness in the Munsell system applies N-2 or less coloring paint to a base-material side, and the glazing paint film formation process which applies the coloring paint containing a vehicle and a HOU-ized lanthanum to a ground-coat side one by one.

[Claim 4] The design nature paint film formation method characterized by giving the ground-coat formation process that the lightness in the Munsell system applies N-2 or less coloring paint to a base-material side, and the glazing paint film formation process which applies the coloring paint containing a vehicle, a HOU-ized lanthanum, and a photoluminescent pigment to a ground-coat side one by one.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the formation method of the new paint constituent which can form the high-class color tone paint film of the purple red system which has depth in various kinds of printed base materials, such as the body of an automobile and its parts, a bicycle, home electronics, and building materials, and a design nature paint film.

[0002]

[Description of the Prior Art] Conventionally, the red pigments [a tradename "SHINKASHIYA Magenta B343D" (product made from Ciba-Geigy)] of a Quinacridone system with blueness and **** are known as a pigment for paints which appears the color tone of a purple red system. However, since it uses it, carrying out color mixture of this pigment to the color pigment of black and others, it is difficult to obtain the color tone paint film which a fall and muddiness of lightness occur and has a feeling of depth. Moreover, in order to give this a feeling of luminosity, when luminosity material like the mica which covered the titanium dioxide was blended and black pigment is added in order to produce the white dotage by the shade section and to inhibit generating of this white dotage, there is a fault which causes the phenomenon in which the whole becomes muddy black.

[0003] On the other hand, the mica pigment is used widely as a paint component for giving photoluminescent [of a feeling of pearl tone gloss] to a paint film, and formation of a paint film is applied on the color middle-coat paint film which colored the paint containing this mica pigment, and is performed by the double layer paint film forming method of the three quart system which forms a clear coat further. The paint technology of setting the lightness of a ground coat which consists of a middle-coat paint film as the specific range in order to raise design nature more is proposed in forming such a double layer paint film.

[0004] For example, the transparent interference coat which contains in JP,61-37423,A the mica which the Munsell color chart covered by 6 - 13% (resin solid-content ratio) of metallic oxide which mainly consists of a titanium dioxide on the color base of N-4 to N-

8 is painted. The covering method of furthermore painting a top clear coat to JP,63-143975,A On the ground coat to which lightness changes from the middle-coat paint film of Munsell values N1-N6 Particle size is 0.1-30 micrometers. The mica base paint containing 1 - 30 % of the weight of coating micas is applied with air atomization type electrostatic-coating equipment on two or more stages. the mica base paint of a parenthesis between un-hardening The automobile finishing method of application which paints a clear paint by the wet-on sentiment is indicated. Moreover, in the laminating paint object which has the mica base layer formed on the color base layer formed on the base, and this color base layer in JP,1-215380,A, the laminating paint object excellent in the design nature in which a color base layer has 10 - 30 low lightness with L* value rather than the lightness of a mica base layer is proposed.

[0005] However, with such paint technology, it does not have intention about being unable to form the paint film excellent in the design nature which presents a feeling of depth, and acquiring the color tone of a purple red system.

[0006]

[Problem(s) to be Solved by the Invention] As a result of repeating research wholeheartedly by making to form the paint film of a purple red system with a feeling of depth into a technical problem, when the vehicle was made to contain conventionally the hoe-ized lanthanum to which its attention was not paid as a paint component, the aforementioned technical problem was solved, and this invention persons checked that the paint film of the purple red which discovers a feeling of depth and a feeling of luminosity simultaneously was obtained, when the photoluminescent pigment was added to this. Furthermore, formation of the coloring finishing paint film which makes lightness in the Munsell system of a ground coat less than [N2], and contains a vehicle and a HOU-ized lanthanum solved that a design nature paint film with a high-class feeling equipped with the aforementioned color tone could be formed.

[0007] this invention was developed based on this elucidation knowledge, and the purpose is in offering the new paint constituent which can form the high-class color tone paint film of a purple red system with a feeling of depth, and the design nature paint film formation method using the paint constituent.

[0008]

[Means for Solving the Problem] The paint constituent by this invention for attaining the above-mentioned purpose is characterized [constitutional] by containing a vehicle and a HOU-ized lanthanum. Moreover, another composition system in the paint constituent of this invention is characterized by containing a vehicle, a HOU-ized lanthanum, and a photoluminescent pigment.

[0009] What mixed cross linking agents, such as acrylic resin, polyester resin, an alkyd resin, a fluororesin, at least one sort of thermosetting resin chosen from polycarbonate resin, amino resin, and/or (block) an isocyanate, as a vehicle which constitutes the paint constituent of this invention is used. These resins can also be used not only combining one sort but combining two sorts or more. In addition, 2 liquid type polyurethane resin, silicone resin, etc. which can be hardened by ordinary temperature dryness can also be used.

[0010] A HOU-ized lanthanum serves as a coloring component which makes purple red color, and either LaB4 or (4 HOU-ized lanthanum) LaB6 (6 HOU-ized lanthanum) and such mixture are used. These HOU-ized lanthanums are usually marketed as powder as

the crystal of the cubic system essentially equipped with the metallic luster of purple red. A character is LaB6. Density 4.76 g/cm³, 2720 degrees C of melting points, and electric specific resistance $8.9 \times 10^{-6} \text{ohmcm}$ (20 **) It has the property and is the material of the quality of a ceramic which is excellent in thermal resistance and abrasion resistance with a high degree of hardness. Although it uses as thermocouple-emission material like the cathode of the former, for example, an electron microscope, it is not observed as a pigment for paints.

[0011] Although there are also a method of carrying out direct solid phase reaction of the metal boron to a metal lanthanum, and the method of carrying out solid phase reaction of a lanthanum trioxide, metal boron or/, and the carbon as a synthesis method of a HOU-ized lanthanum LaB6 When it mentions to an example, it is following (1), returning the mixture of a lanthanum trioxide and boron oxide with carbon industrially. They are the method of compounding by the solid phase reduction reaction of a formula or a lanthanum trioxide, and a boron carbide Following (2) The method of compounding by the solid phase reduction reaction of a formula is taken.

[0012]

$\text{La}_2\text{O}_3 + 6\text{B} + 2\text{C} \rightarrow 2\text{LaB}_6 + 21\text{CO}$ -- (1) $\text{La}_2\text{O}_3 + 3\text{B}_4\text{C} \rightarrow 2\text{LaB}_6 + 3\text{CO}$ -- (2)

[0013] A HOU-ized lanthanum is the particle size of 0.1-15 micrometers. It is 0.1-5 micrometers preferably. It considers as an impalpable powder and combination distribution is preferably carried out in 5 - 35% of the weight of the range five to 50% of the weight to the vehicle solid-content 100 weight section. Coloring of a purple red system with these loadings normal at less than 5 % of the weight is not obtained, but if 50 % of the weight is exceeded, the inclination for appearance to fall will be caused.

[0014] As a photoluminescent pigment added to a vehicle with a hoe-ized lanthanum when giving photoluminescent to a paint film, a scale-like aluminum pigment, the mica pigment which coated the metallic oxide called pearl mica pigment, a tabular iron oxide pigment, a metal plating glass flakes pigment, graphite, etc. can be mentioned. The particle size in the case of using a scale-like aluminum pigment is 1-50 micrometers. It is 5-40 micrometers preferably. It is 10-20 micrometers more preferably. Adjusting to the range, the photoluminescent pigment of a pearl mica pigment and others is the particle size of 1-44 micrometers. It is 5-40 micrometers preferably. It adjusts to the range and use is presented.

[0015] the combination composition in 3 component system of a vehicle, a hoe-ized lanthanum, and a photoluminescent pigment -- the vehicle resin solid-content 100 weight section -- receiving -- the HOU-ized lanthanum 5 - 50 weight sections -- desirable -- 5 - 35 weight section, and the photoluminescent pigment 0.1 - 10 weight sections -- it is preferably set as the range of 0.1 - 6 weight section If it becomes easy to produce unevenness in a paint film, without photoluminescent being [the aforementioned loadings of a photoluminescent pigment] discovered enough in under the 0.1 weight section and 10 weight sections are exceeded, coloring of purple red with a HOU-ized lanthanum will be checked. As for a hoe-ized lanthanum, it is desirable to distribute with a part of vehicle with SG mill etc. beforehand.

[0016] The method of this invention for forming a design nature paint film using the above-mentioned paint constituent containing a HOU-ized lanthanum is characterized [constitutional] by giving the ground-coat formation process that the lightness in the Munsell system applies N-2 or less coloring paint to a base-material side, and the

finishing paint film formation process which applies the coloring paint containing a vehicle and a HOU-ized lanthanum to a ground-coat side one by one. Moreover, the design nature paint film formation method of another mode becomes a base-material side from the composition of giving the ground-coat formation process that the lightness in the Munsell system applies N-2 or less coloring paint, and the finishing paint film formation process which applies the coloring paint containing a vehicle, a HOU-ized lanthanum, and a photoluminescent pigment to a ground-coat side one by one.

[0017] A ground-coat formation process is a process which the lightness of the Munsell system applies N-2 or less coloring paint to a base-material side, and forms a desirable colorless ground-coat layer. As a color pigment, the various extenders of titanium oxide, the organic system regularly used for other paints although lightness is toned in the range of N-1 to N-2 black using carbon black, and an inorganic system are also typically usable white. The system which mixed cross linking agents, such as amino resin and a block isocyanate, to basic resins, such as the same resins as the vehicle of the paint constituent containing the hoe-ized lanthanum mentioned above, i.e., acrylic resin, polyester resin, an alkyd resin, silicon resin, a fluororesin, and polycarbonate resin, is used for the resin for paint film formation. In addition, 2 liquid type polyurethane resin, silicone resin, etc. which are hardened by ordinary temperature dryness can also be used.

[0018] In addition, although the paint for ground-coat formation has a common organic-solvent type, it is not restricted to this and paint composition can be carried out as various kinds of forms, such as a non-water dispersion type, a solution type, and a dispersion-liquid type. Although diluted and used for paint aptitude viscosity with solvents, such as an organic solvent and water, on the occasion of paint, the solid content at the time of paint has 10 - 50 desirable % of the weight. Moreover, you may usually use various kinds of additives used for paints. The dryness thickness of the ground coat to form is 25-50 micrometers. It is 30-40 micrometers preferably. It is a range. Although printing and hardening before the application of top coat is common as for a ground coat, you may perform a finishing application only by carrying out flash plate-off of the solvent, without burning.

[0019] Subsequently, the glazing paint film formation process which applies the coloring paint of composition containing the coloring paint or the vehicle, HOU-ized lanthanum, and photoluminescent pigment of composition containing a vehicle and a hoe-ized lanthanum to a ground-coat side, and forms a finishing paint film in it is given. Although composition of top coat is as having mentioned above, various kinds of additives regularly used by the conventional paint constituent besides these major components can be blended arbitrarily. As an additive, surface-control agents, such as an ultraviolet ray absorbent of curing catalysts, such as dodecylbenzenesulfonic acid, and a benzotriazol system, an antioxidant of a benzo phenol system, and silicone, an organic macromolecule, a dripping stop agent, a thickener, etc. are mentioned, for example. These components can usually improve the performance of a paint or a paint film with the loadings below 5 weight sections to the resin 100 weight section for paint film formation. furthermore, the effect of this invention -- being disadvantage -- it is the range which is not and ** which uses the various color pigments and extender of the organic system regularly used by the paint or an inorganic system is possible

[0020] In addition, although the organic-solvent type of top coat is common, it is not restricted to this and paint composition can be carried out as various kinds of gestalten,

such as a non-water dispersion type, a solution type, and a dispersion-liquid type. Although diluted and used for paint fitness viscosity with solvents, such as an organic solvent and water, on the occasion of paint, the solid content at the time of paint has 10 - 50 desirable % of the weight. moreover, the dryness thickness of the finishing paint film to form -- usually -- 10-30 micrometers it is .

[0021] In a finishing paint film side, it is desirable to carry out topcoat of the clear paint further. Although the transparency resin generally regularly used as a clear paint is used, you may blend a color pigment and various addition components in the range which does not spoil transparency if needed. the desirable dryness thickness of the topcoat to form -- 30-60 micrometers it is -- although -- you may perform paint twice

[0022] Plastic material, such as resin mold goods, such as inorganic material, such as glass including the metals in which the printed base material set as the paint film formation object of this invention contains iron, aluminum, copper, or these alloys, cement, and concrete, polyethylene, polypropylene, an ethylene vinylacetate copolymer, a polyamide, the poly acrylic, polyester, an ethylene-polyvinyl alcohol copolymer, vinyl chloride resin, a vinylidene chloride resin, a polycarbonate, and polyurethane, and various kinds FRP, wood, and textile materials correspond. In addition, it is arbitrary to perform a proper under coat and precoat processing to these printed base materials beforehand.

[0023] Although paint can also be directly performed to a printed base material, under coat paint is carried out, and after [which is generally depended on an electrodeposition paint etc. after a surface chemical conversion, for example in paint of an automobile etc.] an electrodeposited paint film hardens, the paint for ground-coat formation and top coat are painted. Paint operation is performed by air spray painting, electrostatic coating, etc. using a atomization formula coater. Clear paint is performed by the wet-on sentiment, and it bakes simultaneously with a finishing paint film, it hardens, and topcoat is formed.

[0024] Thus, the double layer paint film formed turns into the finishing paint film 3 of the composition which contains a photoluminescent pigment on a printed base material 1 at the N-2 or less lightness ground coat 2, a vehicle, a HOU-ized lanthanum, or this, and a double layer paint film in which the clear coat 4 was formed one by one, as shown in drawing 1 .

[0025]

[Function] this invention presents the point which adopted the HOU-ized lanthanum for the coloring component the 1st, and a color tone with the feeling of depth which fully discovers purple red peculiar to a HOU-ized lanthanum in the shade section to the 2nd, and they are characterized at the point which enabled formation of a high-class paint film which demonstrates photoluminescent [which was simultaneously excellent in the highlight section] .

[0026] That is, although not observed at all as a charge of paint material until now, if a HOU-ized lanthanum follows this invention, offer of the new paint constituent which presents the color tone of a purple red system of it will be attained by making a vehicle distribute coloring coloring matter peculiar to this hoe-ized lanthanum. And the absorption effect of a ground coat is demonstrated by the method of applying the paint of the aforementioned composition to the ground-coat side colored N-2 or less lightness beforehand formed on the printed base material, and since it becomes possible to make the purple red of a HOU-ized lanthanum color vividly, the paint film which has the depth

which has neither a feeling of white dotage nor a feeling of bottom muddiness also in the shade section with a flip-flop can be formed. Furthermore, if a photoluminescent pigment is blended with a paint component, the purple red system paint film of the high-class color tone which the interference color of a photoluminescent pigment and the purple red of a HOU-ized lanthanum are mixed in the highlight section, and discovers a feeling of luminosity simultaneously with a feeling of depth, and has a KARAFU rope will be formed.

[0027]

[Example] Hereafter, the example of this invention is concretely explained as contrasted with the example of comparison. Intermediate coat (sealer), top coat, a photoluminescent pigment, etc. which were applied in each example are as follows. In addition, all the loadings of each component were shown as the weight section of a solid content.

[0028] (1) Intermediate coat (sealer)

The intermediate coat toned so that the lightness in the Munsell system might serve as "Olga S-90 sealer black [the Nippon Paint Co., Ltd. make]" to N-1, N-2, and N-4 using "an Olga S-90 sealer white [the Nippon Paint Co., Ltd. make]" was prepared.

(2) As a top coat HOU-ized lanthanum, it is the particle size of 10 micrometers. LaB6 of the following Powder was used. The resin solid-content 60 weight section, the LaB6 40 weight section, and solvent (toluene / xylene / ethyl-acetate / butyl-acetate = 70/15/10/5) It mixed so that it might become composition of 90 weight sections, and distributed processing was fully carried out with SG mill, and top coat was prepared. As a resin used as a vehicle, it is the copolymer of styrene / methylmethacrylate / ethyl acrylate hydroxyethyl methacrylate / methacrylic acid, and number average molecular weight 20000, a hydroxyl value 45, the acid number 15, acrylic resin of 50% of solid contents, and the melamine resin marketed with the tradename of "you van 20SE [the Mitsui Toatsu Chemicals, Inc. make and 60% of solid contents]" were used.

[0029] Photoluminescent pigment (the display to Tables 1-4 is based on a beginning sign);

: (aluminum-foil)] by scale-like aluminum pigment "ARUPESUTO 7640" [Toyo Aluminium K.K.

(Mica-1) : titanium-dioxide covering mica "IRIOJIN 103 pigment WII" [Merck Japan make and silver interference mica]

(Mica-2) : titanium-dioxide covering mica pigment "exterior Merlin super blue" [marl company make and blue interference mica]

(Mica-3) : titanium-dioxide covering mica pigment "exterior Merlin super red" [marl company make and red interference mica]

(Mica-4) : iron-oxide covering mica pigment "NP black N blue WII" [the Merck Japan make and a black interference mica]

[0030] Each component of examples 1-9 and the example of comparison 1 above was painted on the ground coat by the following painting processes using the top coat which carried out combination formation by the composition ratio shown in Tables 1-3. To a dull-steel-sheet base material with a thickness of 0.8mm which carried out the chemical conversion with phosphoric-acid zinc, a dry paint film is 25 micrometers about a cation electrodeposition paint [the Nippon Paint Co., Ltd. make and the "power top U-50"]. After painting so that it may become, it was able to be printed for 30 minutes at 160 degrees C. A dry paint film is 40 micrometers about intermediate coat to this

electrodeposited paint film side. Air spray painting was carried out so that it might become, and it burned for 30 minutes at 140 degrees C, and the ground coat was formed. [0031] Subsequently, as it has been 20 degrees C and 12 - 15 seconds by Ford cup #4, viscosity control of the top coat is carried out to a ground-coat side with a solvent (toluene / xylene / ethyl-acetate / butyl-acetate = 70/15/10/5), and a dry paint film is 16-20 micrometers. It painted so that it might become. Paint was performed by ***** 2.8 kg/cm² using the electrostatic coater [the product made from RANZUBAGUGEMA, and Auto REA], and the atmosphere of the booth under paint was held to the temperature of 25 degrees C, and 75% of humidity. Dryness thickness is about 35 micrometers about the acrylic resin system clear paint [the Nippon Paint Co., Ltd. make and the "super rack 0-100"] after performing setting for after [paint] 3 minutes. It painted so that it might become. Subsequently, after setting at a room temperature for about 10 minutes, it was able to be printed for 30 minutes at 140 degrees C.

[0032] Thus, judgment evaluation of the optical measurement and the feeling of white dotage by visual observation, the feeling of bottom muddiness, and the feeling of depth of the hue [lightness (L*) and saturation (C*)] in a CIE (L*, a*, and b*) display system was carried out on the following criteria about the double layer paint film which consists of the ground coat, finishing paint film, and top clear paint film which were formed in the base-material side. The result was made to contrast with combination composition etc., and was shown in Tables 1-3.

[0033] Measurement of the hue in a CIE (L*, a*, and b*) display system; The product made from a deflection colorimeter [SUGA testing machine, Using VC-1 type], as shown in drawing 2, the light source was illuminated from the perpendicular at the angle of 45 degrees to the measurement sample which carried out paint film formation, and light was received [of the lighting angle] from mirror reflection to the light source side at the angle of 30 degrees (the point H of the highlight direction receiving light), and 120 degrees (the point S of the direction of the shade receiving light). It is this L* a * b * of lightness-saturation A colorimetry is carried out by the color coordinate system, and they are lightness (L*) and saturation (C*). The value was measured. In addition, C* {(a*)²+(b*)²} One half It calculated.

[0034] Criteria of visual judgment evaluation; the criteria of the judgment evaluation by visual observation were depended below.

feeling of white dotage: -- O-less ** -- weak x -- strong feeling of bottom muddiness: -- O-less ** -- weak x -- strong feeling of depth : O -- strong ** -- weak x -- nothing --

[0035]

[Table 1]

成分・評価	実施例 1		実施例 2		実施例 3		実施例 4	
L a B _a	5.7		11.4		22.9		22.9	
Mica-1	—		—		—		—	
Al-箔	—		—		—		—	
Mica-2	—		—		—		—	
Mica-3	—		—		—		—	
Mica-4	—		—		—		—	
アクリル樹脂	80		80		80		80	
メラミン樹脂	20		20		20		20	
下地明度	N-1		N-1		N-1		N-2	
色 調 ⁽¹⁾	S	H	S	H	S	H	S	H
L* (明度)	4.1	5.7	4.3	6.5	4.6	8.2	4.5	8.2
C* (彩度)	7.6	13.9	10.9	17.8	14.6	21.4	15.5	21.6
白ぼけ感	○		○		○		○	
底濁り感	○		○		○		○	
深み感	○		○		○		○	

[Front notes] (1) S shows the shade and H shows a highlight (it is the same hereafter).

[0036]

[Table 2]

成分・評価	実施例 5		実施例 6		実施例 7		実施例 8	
L a B ₉	22.9		22.9		22.9		22.9	
Mica-1	0.6		—		—		—	
Al-箔	—		0.3		—		—	
Mica-2	—		—		0.6		—	
Mica-3	—		—		—		0.6	
Mica-4	—		—		—		—	
アクリル樹脂	80		80		80		80	
メラミン樹脂	20		20		20		20	
下地明度	N-1		N-1		N-1		N-1	
色 調 ⁽¹⁾	S	H	S	H	S	H	S	H
L* (明度)	4.6	16.0	4.9	24.3	4.6	10.7	4.6	12.2
C* (彩度)	14.9	13.0	14.8	10.5	15.7	19.6	15.2	21.2
白ぼけ感	○		○		○		○	
底濁り感	○		○		○		○	
深み感	○		○		○		○	

[0037]

[Table 3]

成分・評価	実施例 9		比較例 1	
L a B ₆	11.4		11.4	
Mica-1	—		—	
Al-箔	—		—	
Mica-3	—		—	
Mica-4	5.7		—	
アクリル樹脂	80		80	
メラミン樹脂	20		20	
下地明度	N-1		N-4	
色 調 ⁽¹⁾	S	H	S	H
L* (明度)	4.3	15.7	16.8	19.5
C* (彩度)	8.4	8.6	6.9	8.9
白ぼけ感	○		×	
底濁り感	○		—	
深み感	○		×	

[0038] Each double layer paint film of the examples 1-4 formed from the result of Tables 1-3 according to the method of this invention using the paint constituent containing the HOU-ized lanthanum by this invention is L^* of the shade section relatively. A value is low and it is C^* . It is expensive and is C^* of the highlight section. The value was high, and there were not a feeling of white dotage and a feeling of bottom muddiness, and it was the color tone paint film of the good purple red of Moreover, the double layer paint film of the examples 5-8 which blended the photoluminescent pigment with this is L^* of the highlight section. It was admitted that a value became high and the outstanding feeling of luminosity was given. On the other hand, in the example 1 of comparison whose lightness of a ground coat is N-4, a feeling of white dotage appeared and a feeling of depth was not obtained, either.

[0039] Replacing with the Quinacridone organic pigment which has the color tone (red seasoned with blue and purple) which approximates the HOU-ized lanthanum used in the two to example of comparison 6 example, as other pigments, using the thing of the same kind as an example, the following and the photoluminescent pigment changed combination composition and prepared top coat like the example. Dryness thickness is 16-20 micrometers on the same ground coat as the example 1 which applied intermediate coat to the printed base material side for each obtained top coat. It painted and the finishing paint film was formed so that it might become.

[0040] Pigments (the display to Table 4 is based on a beginning sign) used for the example of comparison;

(QC):] made from Quinacridone organic pigment "SHINKASHIYA Magenta B343D" [Ciba-Geigy

(CB):] by carbon black pigment "carbon black FW200" [Degussa

(Ti):] by titanium pigment "titanium CR-97" [Ishihara Sangyo Kaisha, Ltd.

: (Fe-1)] made from iron oxide pigment "transformer oxide red 30-1005" [HIRUTON DEBISU

: (Fe-2)] made from iron oxide pigment "support FR-110GN" [**** Pigment Industry

[0041] Thus, judgment evaluation of the optical measurement and the feeling of white dotage by visual observation, the feeling of bottom muddiness, and the feeling of depth of the hue [lightness (L^*) and saturation (C^*)] in a CIE (L^* , a^* , and b^*) display system was carried out like the example about the double layer paint film which consists of the ground coat, finishing paint film, and top clear paint film which were formed in the base-material side. Combination composition etc. made the result contrast and it was shown in Table 4.

[0042]

[Table 4]

項目	比較例 2		比較例 3		比較例 4		比較例 5		比較例 6	
Q C	22.1		12.0		5.9		12.0		17.5	
C B	1.1		1.6		2.3		1.2		1.5	
Ti	3.2		—		—		—		—	
Fe-1	—		6.4		1.0		6.2		—	
Fe-2	3		—		—		—		2.4	
Mica-1	—		5.9		—		—		—	
AL-箔	—		—		1.5		—		—	
Mica-2	—		—		—		6.0		—	
Mica-3	—		—		—		—		3.0	
アクリル メラミン	80 20		80 20		80 20		80 20		80 20	
下地明度	N-1		N-1		N-1		N-1		N-1	
色 調	S	H	S	H	S	H	S	H	S	H
L* 明度	6.2	6.4	5.4	15.2	4.6	23.5	6.9	8.2	6.0	10.3
C* 彩度	20.5	18.1	7.9	11.6	5.6	9.1	14.3	17.8	13.5	18.1
白ぼけ感	×		×		△		×		×	
底濁り感	○		×		×		△		△	
深み感	×		×		×		×		×	

[0043] Although it is replaced with the HOU-ized lanthanum of an example 3 and is equivalent to the paint system using the Quinacridone pigment of a same color system, in this example, the example 2 of comparison is the relation which mixes a carbon black pigment and a titanium pigment as other pigments, and a feeling of white dotage arises and it shows the result whose feeling of depth is lost. Moreover, being inferior compared with the paint film of the example which carries out considerable [of a feeling of white dotage, a feeling of bottom muddiness, and the feeling of depth] also in the examples 3-6 of comparison of the composition which blended the photoluminescent pigment is admitted (in an example 6 and the example 5 of comparison, an example 7 and the example 6 of comparison correspond [the example 3 of comparison / an example 5 and the example 4 of comparison] with an example 8, respectively).

[0044] It is as follows when the desirable embodiments of this invention including the above-mentioned example are mentioned.

(1) The paint constituent and the design nature paint film formation method HOU-ized lanthanums are a 4 HOU-ized lanthanum (LaB4) or/, and a 6 HOU-ized lanthanum (LaB6).

(2) The loadings of a HOU-ized lanthanum are 5 - 50 weight section, the paint constituent

which is 5 - 35 weight section preferably, and the design nature paint film formation method to the vehicle solid-content 100 weight section.

(3) the vehicle solid-content 100 weight section -- receiving -- the loadings of a HOU-ized lanthanum -- 5 - 50 weight section -- desirable -- 5 - 35 weight section -- it is -- the loadings of a photoluminescent pigment -- 0.1 - 10 weight section, the paint constituent which is 0.1 - 6 weight section preferably, and the design nature paint film formation method

(4) The formation method of a design nature paint film with the colorless hue of a ground coat.

(5) The paint constituent and the design nature paint film formation method a photoluminescent pigment is a scale-like aluminum pigment, the mica pigment which coated the metallic oxide called pearl mica pigment, a tabular iron oxide pigment, a metal plating glass flakes pigment, or graphite.

(6) The design nature paint film formation method which forms a clear paint film by the wet-on sentiment on the finishing paint film containing the HOU-ized lanthanum.

(7) That with which the vehicle of a finishing paint film mixed cross linking agents, such as acrylic resin, polyester resin, an alkyd resin, a fluoro-resin, at least one sort of thermosetting resin chosen from polycarbonate resin, amino resin, and/or (block) an isocyanate, is used. These resins combine not only one sort but two sorts or more, come out, and are a certain design nature paint film formation methods.

[0045]

[Effect of the Invention] According to the paint film formation method using the paint constituent and this which start this invention as above, it becomes possible by using a HOU-ized lanthanum as a coloring component to form the paint film of the purple red system which there is neither a feeling of white dotage nor a feeling of bottom muddiness, and demonstrates photoluminescent [the outstanding feeling of depth and photoluminescent / outstanding]. Therefore, it is very useful for the purpose which begins to paint [outside] the automobile body as which high-class paint color is required, and forms a quality double layer paint film to various kinds of printed base materials.